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Gradings on upper triangular matrices and their graded automorphisms

It is well known that every automorphism of a central simple associative algebra is inner. The same statement was proved to be true for the associative algebra of upper triangular matrices. Similar questions can be raised for algebras with additional structure, for example, in the context of graded algebras. Recently, graded algebras constitute a subject of intense investigation, due to its naturalness in Physics and Mathematics. The polynomial algebras (in one or more commutative variables) are the most natural structure of an algebra with a grading - given by the usual degree of polynomials. For instance, the classification of finite dimensional semisimple Lie algebras gives rise to naturally $\mathbb{Z}^m$-graded algebras. Kemer solved a very difficult problem known as the Specht property in the theory of algebras with Polynomial Identities in the setting of associative algebras over fields of characteristic zero, using $\mathbb{Z}_2$-graded algebras as a tool. After the works of Kemer, interest in graded algebras increased greatly.

In this poster, we present all the gradings on the algebra of upper triangular matrices and show the self-equivalences, the graded automorphisms, the Weyl and diagonal groups, considered as associative, Lie and Jordan algebras. We also cite their graded involutions on the associative case.